

Assessment of Ultimate Drift Capacity of RC Shear Walls by Key Design Parameters

Tokyo Institute of Technology/ Advisor Prof.Kono/ Chanipa Netrattana

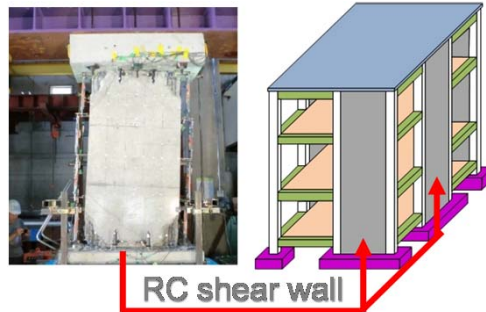
1. Introduction

The 2010 Off Maule Chile Earthquake caused severe damage to a large number of RC structural walls in mid-rise and high-rise buildings. In order to reduce damage from this failure mode, the ultimate drift capacity of RC shear walls needs to be estimated accurately



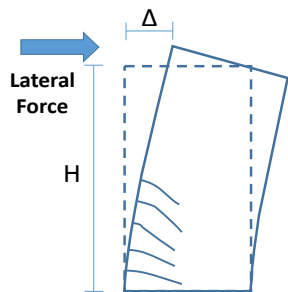
A parametric study of the seismic behavior of RC shear walls was conducted using a fiber-based model to investigate the influence of basic design parameters as flowing list;

- Concrete strength (f'_c)
- Shear rebar ratio (ρ_s)
- Axial load level (η)
- Boundary column dimension (B and D)



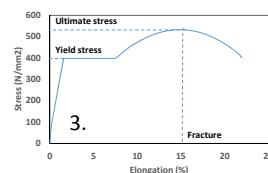
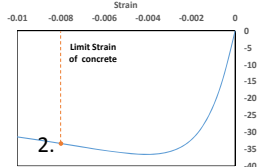
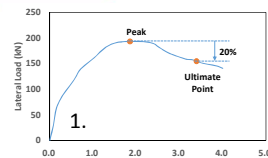
2. What is "Ultimate Drift" ?

$$Drift, R = \frac{\Delta}{H}$$

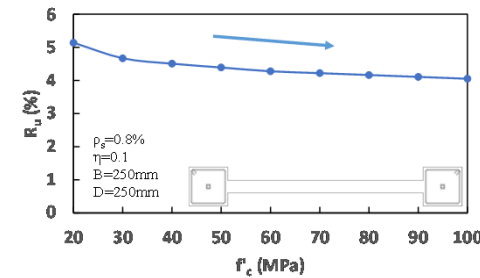


Ultimate drift is the drift when walls fail. In numerical analysis, the walls are considered to be "fail" when

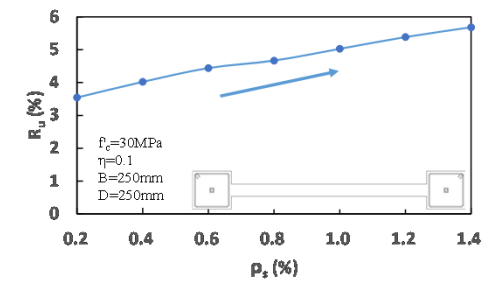
1. Lateral load drop to 0.8 of peak load
2. Limit strain of extreme concrete fiber reach limit strain of confined concrete
3. Strain of longitudinal rebar reach limit strain of steel rebar



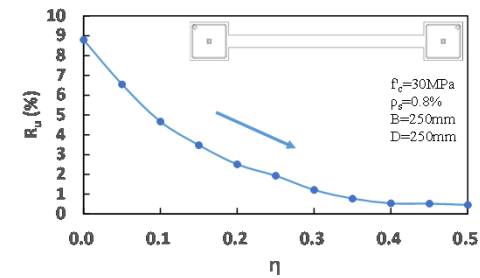
3. Results of Parametric Study



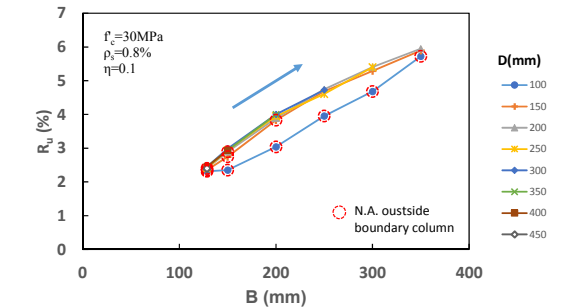
Influence of concrete strength



Influence of transverse reinforcement ratio



Influence of axial load ratio



Influence of boundary column dimensions

4. Conclusions

- The axial load ratio is the most influential parameter. Increasing the axial load ratio results in the ultimate drift capacity deteriorating considerably.
- Increased transverse reinforcement increases ultimate drift capacity.
- Higher concrete strength slightly reduces the ultimate drift capacity.
- Larger boundary column width enhances the ultimate drift capacity for any column depth.

5. Recommendations

For RC walls which are similar with these studied walls, a particular attention must be paid to the axial load ratio. An axial load ratio should not higher than 0.2. Regarding sizing the boundary columns, a larger column width always improves the ultimate drift capacity. The boundary column size can be optimized for the required ultimate drift and practical construction constraints. Finally, the amount of transverse steel can also be adjusted to achieve desired drift capacities.

